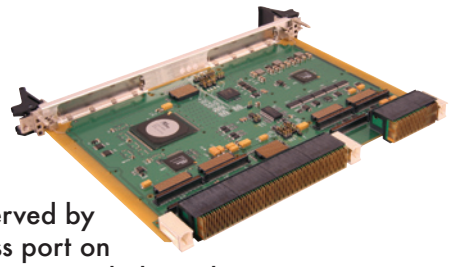


PRODUCT DATASHEET

VPX6-215

6U VPX/VPX-REDI ExpressReach PMC/XMC and IPM Carrier Card



Features

- Backplane Fabric Interface
  - Four 4-lane PCI Express links to the VITA 46 P1 connector (A, B, C, D)
  - Choice of which backplane PCI Express port is the upstream port is user selectable
  - User can select backplane ports A and B to function as a single 8-lane PCI Express upstream port
  - User can select backplane ports C and D to function as a single 8-lane PCI Express upstream port
- XMC/PMC site #1:
  - Supports PCI-X at 66 MHz and PCI at 33MHz, 64-bit
  - 8-lane PCI Express interface to P15
  - 5V tolerant with respect to PMC connectors
  - Supports 64 signals (32 diff pairs) of PMC I/O including differential routing to backplane per pattern "P64s" of VITA 46.9
  - Supports 24 signals (12 pairs) of XMC I/O to backplane per pattern "X12d" of VITA 46.9
  - PCI-X interface is served by a 4-lane PCI Express port on the central PCI Express switch through a PCI Express-to-PCI bridge
- XMC/PMC site #2
  - Supports PCI-X 33, 66 or 133MHz, and PCI at 33 or 66MHz, 64-bit
  - 8-lane PCI Express interface to P25
  - NOT 5V tolerant with respect to the PMC connectors
  - Supports 64 signals (32 diff pairs) of PMC I/O including differential routing to backplane per pattern "P64s" of VITA 46.9
  - Supports 24 signals (12 pairs) of XMC I/O to backplane per pattern "X12d" of VITA 46.9
  - PCI-X interface is served by a 4-lane PCI Express port on the central PCI Express switch through a PCI Express-to-PCI bridge
- IPM Site
  - Supports PCI-based functionality of the SCSI, 1553, and SATA IPM (i.e., no discretes or IPM serial ports)
  - Backplane I/O mapping for the features supported is the same as the VPX6-185
  - When an IPM is installed, the maximum PCI Express link width for XMC #1 is 4 lanes
- Utility Features
  - The VPX6-215 drives the MRSTI# signal to each XMC for a duration greater than 10msec from the time onboard power is stabilized in accordance with the VITA 42.0 specification
  - User selectable option to drive the VITA 46 SYSRESET* signal for a minimum of 10msec in response to an XMC reset from either XMC or a local VPX6-215 power-on reset
- Front Panel Indicator Provisions
  - A red Fail LED is provided that can be set via I2C bus, the default state is OFF
  - A green LED is provided that goes on when all onboard power supplies are within specification

Overview

Curtiss-Wright Controls Embedded Computing's VPX6-215 is one of a family of modules from Curtiss-Wright to employ the new open architecture VITA 46 standard. VITA 46, also known as "VPX" was collaboratively developed by COTS industry leaders which included prime military integrators to marry high-speed serial interconnect such as Serial RapidIO and PCI Express (PCI Express). It is well suited to the Miltary/ Aerospace which can take advantage of and utilize this form factor and feature set in their demanding applications.

The VPX6-215 ExpressReach PMC/XMC and IPM carrier card provides great flexibility to system integrators needing to expand their VPX-based systems' I/O complement via standard PMC modules and/or XMC modules. A direct PCI Express connection over the VPX backplane allows host processors access to a high-performance, low latency native PCI Express interface to the VPX6-215 carrier card.

The PMC/XMC sites of the VPX6-215 provide tremendous flexibility in the range of modules supported – from the latest generation high-performance XMC utilizing 8-lane PCI Express links to older generation standard PMCs - including those that use 5V signaling. To a host processor, PMC and XMC modules on the VPX6-215 appear as if they were on the host processor. A standard 4-lane PCI Express interface provides a nominal data rate of 1GB in each direction.

The Interface Personality Module (IPM) site of the VPX6-215 further extends the I/O expansion capability of the VPX6-215. Any of the IPM functions provided by PCI devices can be supported on the VPX6-215. This includes dual MIL-STD-1553 channels, Serial ATA, and SCSI options.

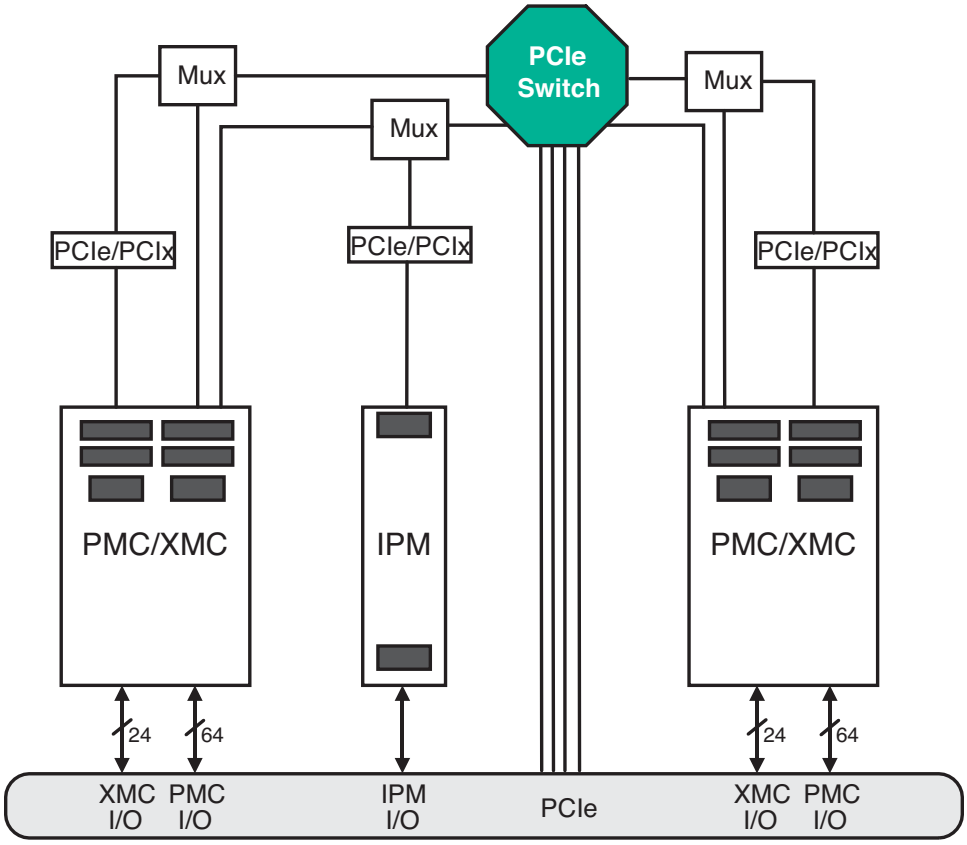
VPX Module Format

The Versatile Performance Switching (VPX) module format, governed by the VITA 46 specification and the associated VITA 48 Ruggedized Enhanced Design Implementation (REDI) was established to address the fundamental requirement to provide open-architecture modules that incorporate the high-speed serial interconnect technology that is becoming pervasive in high performance computing.

The VPX standard was developed by leading providers of COTS modules to address the major issue of high-speed serial interconnect, as well as incorporating numerous improvements learned after years of integrating VME and CompactPCI modules. The VPX standard, in short provides:

- 3U and 6U Eurocard form factors preserve chassis mechanical designs
- Support four x4 serial interfaces as the primary fabric
- Support 128 differential pairs for modern high-speed interfaces such as DVI, SATA, SFPDP, SAS and custom sensor interfaces
- Optional support of VME for interoperability with legacy equipment
- Support of higher power modules and improved cooling
- Improved logistics with two-level maintenance and keying

The VPX module format provides many benefits to integrators of high-performance multiprocessor systems for radar, electro-optical and signal intelligence applications. In particular Serial RapidIO is suited to high-bandwidth communications between processors in a VPX system, while PCI Express functions as a fast connection between processors and the new generation of XMC modules which can easily be placed on VPX format carrier cards.



VITA 46 Connectors

Backplane Fabric Ports

The VPX6-215 connects to other cards via four, 4-lane PCI Express ports thru the VITA 46 P1 connector (ports A, B, C, D). All PCI Express ports go through a PLX PEX8532 PCI Express switch.

The backplane ports A and B, can be selected to function as either 2, 4-lane PCI Express ports or as a single 8-lane upstream port. The backplane ports C and D can also be selected to function as either 2, 4-lane PCI Express ports or as a single 8-lane upstream port. The selection of lane width is via on board jumpers, as is the choice of which backplane PCI Express port is the upstream port. Note that there can only be one active upstream port.

Alternatively, the VPX6-215 can be built with a optional BOOT configuration EPROM which can be written to through the I2C interface. This is not a standard product offering, please contact factory.

XMC/ PMC Sites

The VPX6-215 is equipped with two mezzanine sites, each capable of supporting IEEE 1386 PMC or VITA 42.3 XMC modules. The VPX6-215 takes full advantage of the VPX standard by providing 64 signals (32 pairs) of Pn4 I/O and 24 signals (12 pairs) of differential Pn6 I/O from each of its mezzanine sites to the backplane connectors. The I/O is mapped according to the VITA 46.9 draft specification which provides for controlled impedance, matched length differential pairs.

Both XMCs sites utilize up to a 8-lane PCI Express host interface on the Pn5 connector.

Only the PCI Express or PCI(-X) interfaces can be active at any one time. The active interface is determined automatically depending on whether an XMC or PMC is installed.

On conduction cooled cards, the XMC/PMC sites adhere to the VITA 20- 2001 (R2005) Conduction Cooled PCI Mezzanine Card standard specifications. To optimize the thermal transfer from XMC/PMC modules to the base card the standard VPX6-215 thermal frame incorporates both the Primary and Secondary thermal interfaces as defined by VITA 20-2001.

The VPX6-215 is capable of hosting Processor PMCs in non-Monarch mode as described in the VITA 32-2003 draft standard (the Monarch# signal is left floating). The VPX6-215 does not support the optional second PCI agent, the optional EREADY signal, or the optional RESETOUT# signal.

Note that when an IPM is installed, the maximum PCI Express link width for XMC #1 is 4 lanes.

Table 1 XMC/PMC site specifications provides details on the capabilities of both mezzanine sites.

Table 1: XMC/PMC Site Specifications

Function	Site 1	Site 2
Location	Top of card	Bottom of card
PCI interface	PCI-X 64-bit 66Mhz via 4-lane PCI Express/PCI bridge	PCI-X 64-bit 133Mhz via 4-lane PCI Express/PCI bridge
PCI Express interface	Up to 8-lane per VITA 42.3 (Note) 2GB/s peak simultaneous transmit and receive	Up to 8-lane per VITA 42.3 (Note) 2GB/s peak simultaneous transmit and receive
Pn4 I/O	64 signals (32 pairs) to VITA 46 P3 per VITA 46.9, rule 5-5, pattern P64 (P3-64s)	64 signals (32 pairs) to VITA 46 P5 per VITA 46.9 rule 5-5, pattern P64 (P5-64s)
Pn6 I/O	24 signals (12 pairs) to VITA 46 P4 per VITA 46.9, rule 5-5, pattern x 2D (P4-x 2d)	24 signals (12 pairs) to VITA 46 P6 per VITA 46.9, rule 5-5, pattern x 2D (P6-x 2d)
Differential routing	100 Ohm differential, 50 Ohm nominal for both Pn4 and Pn6 I/O signals	
VIO	Jumper select for 3.3V or 5V	3.3V operation only
3.3V power	Provided from on-board PSU, 13W maximum to any one site. 20W total maximum. The 3.3V is sequenced with the main board power.	
5.0V power	Drawn from backplane 5.0V 20W maximum to any one site, 30W maximum total. The 5V is sequenced with the main board power.	
12v XMC Only	Power for XMCs is selectable to be provided by backplane 5V or 12V through jumper selection. Max Power is 20W.	Power for XMCs is selectable to be provided by backplane 5V or 12V through jumper selection. Max Power is 15W.
Note : The lower 4-lanes of the PCI Express interface are either switched to the PCI Express/PCI bridge for PMC operation, or switched to the Pn5 connector for XMC operation.		

IPM Site

The VPX6-215 provides for additional I/O expansion capability with the inclusion of an Interface Personality module (IPM) site. The IPM concept, carried forward from the VME-182 and 183 SBCs, and used on the VPX6-185 is a connectorized subassembly that allows these SBCs to provide additional optional I/O such as serial ports, DIO and DIFFIO, SATA, SCISI or MIL-STD-1553. Note that SCSI is not provided as a standard product offering.

Because the VPX6-215 does not have a supporting FPGA as does the VPX6-185, IPM functions provided by PCI devices are only supported on the VPX6-215. This includes dual MIL-STD-1553 channels, Serial ATA, and SCSI options. The serial ports and DIO are not supported on the VPX6-215.

Note: When an IPM is installed, the maximum PCI Express link width for XMC #1 is 4 lanes.

Refer to Table 2 for a summary of the I/O configurations that are available on the VPX6-215.

Table 2: Supported IPM Configurations

Mode	Backplane Connector P1-P6
1	8 Bit SCSI
4	16 Bit SCSI
9	2 Channles of Dual Redundant Mil-STD-1553
12	2 Channels of Serial ATA
Note: Mode 1 and 4 are not a standard product offering, please contact factory	

Status Indicators and Controls

The VPX6-215 supports two front panel indicator LEDS. A red Fail LED is provided that can be set via the I2C bus; the default state is OFF. A green LED is provided that goes on when all onboard power supplies are within specification. Should any of the onboard power supplies fail; the LED will not be lit.

Each PCI Express lane for the backplane fabric ports and on board PCI Express ports (switch to XMC site and PCI Express bridges PCI sites) has an indicator led that when lit indicates that the lane has been trained and is operational.

I2C

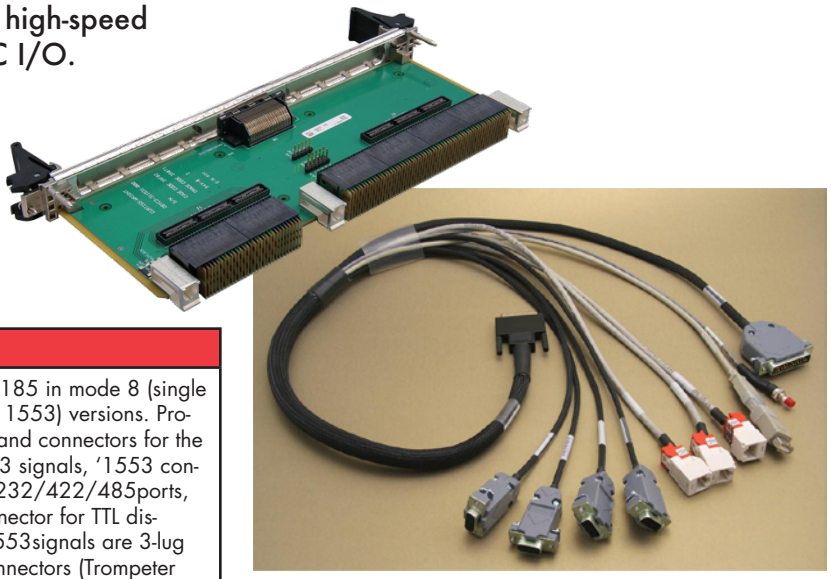
The VPX6-215 has the ability to connect to two I2C interfaces from the backplane P0 connector. Either I2C interface can be selected for control by an I2C master. Functions that can be controlled via the I2C interface are:

- Control the state of the Red FAIL led.
- Reset the board
- Control the power state of the board (powered on or off).
- Read the state of the XMC, PMC and IPM present signals.
- Control the selection of the Upstream port of the 8532.
- Read the XMC MBIST_L signal.
- Program the 8532 Configuration Boot ROM

Cables and Rear Transition Module

The VPX6-215 makes use of cables and a RTM (rear-transition module) already developed for VPX6-185. To gain access to the backplane I/O signals of the VPX6-215, the Rear Transition Module (RTM), RTM6-185-000, is used. The RTM6 is a 6Ux81.5 mm (VITA 46.10 compliant) module with a rear face plate and injector/ ejector handles that plugs into the rear of the VPX backplane to make connections with the I/O signals emanating from the VPX6-215. The VPX6-185 RTM features a 136-pin high density connector that in conjunction with a breakout cable provides access to all of the base-card I/O and IPM module I/O.

Different breakout cables are available for each basecard/IPM combination. The RTM provides additional high-speed connectors to provide access to PMC/XMC I/O.



VPX6-215 Supported Cables

Product Number	Connects to	Description
CBL-185-IPM-009	VPX6-185 RTM IPM mode 9 cable	Break-out cable for VPX6-185 in mode 8 (single 1553) and mode 9 (dual 1553) versions. Provides separate branches and connectors for the transformer-coupled '1553 signals, '1553 configuration inputs, two RS-232/422/485ports, and 25-pin female D connector for TTL discretes. Connectors for '1553signals are 3-lug Twinax bulkhead jack connectors (Trompeter part number BJ79-47). This cable connects to the high-density connector for IPM-specificI/O on RTM6-185-000. Note: Only the 1553 Connections can be used.
CBL-185-IPM-012	VPX6-185 RTM IPM mode 12 cable	Break-out cable for VPX6- 85 in mode 12 with Dual Serial ATA connections.

Specifications

The tables below show the power, dimensions and weight characteristics of the card.

Power Requirements	
3.3V Aux	500 mA
5V (VS3)	2A
12V (VS1/VS2)	Used by XMC Only
12V Aux	Not used
-12V Aux	Not used

Dimensions and Weight		
Option	Dimensions	Weight
Air-cooled 0.8"	Per VITA 46 draft 0.8" pitch	TBD
Air-cooled 1.0" option	Per VITA 48 draft 1.0" pitch	TBD
Conduction cooled	Per VITA 46 draft 0.8" pitch	TBD
Conduction cooled LRM	Per VITA 48 draft, 0.85" pitch	TBD
Note. The air-cooled format is designed to fit chassis with 0.8" slot pitch. For convenience it is offered with a 1" front panel to accommodate installation in 1" pitch chassis. Air-cooled cards available in temperature ranges 0 and 1.* Conduction-cooled cards available in temperature ranges 1 and 2. Conduction cooled cards available in a covered, 2-level maintenance LRM configuration. * Refer to Ruggedization Guidelines data sheet for more information.		

Cooling Air Requirements		
Configuration	Temperature Range	Air-Flow
-	-40°C to 71°C	10 CFM
Air-flow is specified for sea-level conditions. The temperature refers to the inlet temperature at the card. The air-flow specifications are for worst case (highest power) conditions, without any PMC/XMCs installed. Curtiss-Wright can supply additional recommendations for specific power/temperature/altitude scenarios and pressure drop characteristics of the 185 support the design and testing of cooling subsystems.		

Ruggedization Levels

Air-cooled cards are available in levels 0, 100. Conduction cooled cards are available in levels 100 and 200 and a 2-level maintenance (LRM) configuration with ESD protective covers. See the Curtiss-Wright ruggedization guidelines data sheet for more information.

Circuit card assembly is done to class 3 standards of IPC-A-610C, Acceptability of Electronic Assemblies. Standard conformal coating is acrylic PWB meets UL 94 V-0 flammability rating

Ordering Information

The VPX6-215 is ordered with the following part numbers. Not all possible configurations are offered; hence consult Curtiss-Wright for available configurations.

Part Numbers

VPX6 - 215 - U V W X Y Z Z

- I/O mode
  - IPM options 01, 04, **09, 12**
- Reserved
- Backplane I/F:
  - **A: 4 fabric ports configurable - PCIe**
  - Z: custom configuration
- Mechanical Format:
  - **1: 0.8" pitch, no 2-level maintenance support, 1" faceplate on Air Cooled**
  - **3: 0.85" pitch, 2-level maintenance support (covers)**
- Temperature Range:
  - **0: 0 to 50C**
  - **1: -40 to 71C (Air cooled only)**
  - **2: -40 to 85C**
  - **5: -25 to 50C (level 50) (Customer Specific only)**
- Cooling Method:
  - **A: Air cooling**
  - **C: Conduction-cooling**
- Model Number
- Standard Prefix for 6U VPX cards

Options in bold will be available as standard product with following limitations:

- Not available withVME interface.
- All others available as customer specific variants with CM Service.
- 2 level maintenance covers (LRM) are only available with conduction cooled variants.
- Level 100 Conduction Cooled will be available as customer specific variants with CM Service.

Contact Information

To find your appropriate sales representative, please visit:

Website: www.cwcembedded.com/sales

Email: sales@cwcembedded.com

For technical support, please visit:

Website: www.cwcembedded.com/support1

Email: support1@cwcembedded.com